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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/065,486

10/23/2002

Tin-Su Pan

124695

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10/18/2007

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EXAMINER

LAMPRECHT, JOEL

ART UNIT

PAPER NUMBER

3737

MAIL DATE

DELIVERY MODE

10/18/2007

PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary

Application No.

10/065,486

Applicant(s)

PAN ET AL.

Examiner

Joel M. Lamprecht

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 03 July 2007.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-3, 5-11, 13-17 and 21-31 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-3, 5-11, 13-17, 21-31 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- ☒ Notice of References Cited (PTO-892)
- ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- ☐ Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date _____.
- ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____.
- ☐ Notice of Informal Patent Application
- ☐ Other: _____.

DETAILED ACTION

Response to Arguments

1. Applicant's arguments filed 7/3/07 have been fully considered but they are not persuasive. Regarding the argument that an axis, which American Heritage and Merriam Webster both define as "A line which bisects a 2d body or about which a 3d body is symmetrical", the Examiner respectfully disagrees with Applicant. From the definition of axis, it is inherent that a mathematician or designer has free reign in choosing the definition of his or her axes. An axis does not in and of itself serve the purpose to define only one specific direction. It is for this reason that engineers are capable of choosing a coordinate system when working on a problem. Axes are defined in relation to the system, and the relative nature of an axis gives weight to the fact that they can be assumed, presumed, or defined in relation to anything at any moment in time, space, or frequency. An axis itself is a fixed reference, but only in relation to the system for which it is acting. Applicant has chosen to define the axial direction as the direction of motion of a movable table, the motion of that table of course being into the machine for imaging. Based on that *assumption* of axis, a subdivision of elements, namely pixels or voxels would then be defined. Axes are arbitrary, and simple coordinate shifts can be used to perform any mathematical operation in one coordinate system with respect to any other, which fails to further limit the claims of record.
2. Regarding the arguments to pixel and voxel data, Examiner notes that image data is used to represent the physical image elements, that is the sub-target areas.

Pixel data is image data of a sub-target area of an image which has some multiple (usually a fraction) of the area of the detector element.

3. Examiner will agree that an area of coverage is defined by the term "director coverage" but still disagrees that "an area of detection capability" limits either the physical size of the sub-target areas being examined.

4. With respect to the amendment to claim 1 therein "...processing said image data to determine a phase of said image data; synchronizing said image data; and combining said synchronized image data for each of said sub-target areas to create a set of image data of the target area of interest..." Examiner points to Column 4 Lines 25-42 which recites inter alia, "...the gating is used to trigger data acquisition by the imaging apparatus at the same point in each of a series of consecutive cycles until enough data is acquired to complete the reconstruction. In this manner, the data is repeatedly captured at the same relative time in each cycle..." This method is used to combine *"synchronized" image data*.

5. Finally regarding claim 29, the Examiner took the claim to define to one of ordinary skill in the art that a "factor" or increment stays constant throughout processing. Applicant could also be referencing the spatial dimension e.g. one, two or three-dimensional data which is stored as an increment of detector coverage must stay constant. If either of these cases is true, then the use of picture elements which are of the same size, shape and dimension discloses the claim substantially.

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

1. Claims 1, 3, 6, 7, 9, 11, 13-15, 21, 24, 26, 27, and 29-31 are rejected under 35 U.S.C. 102(e) as being anticipated by Barni (U.S. Patent No. 6,473,634).
2. Barni teaches a method and system for registering images of a patient using retrospective gating including determining a target area (col. 2 line 10-13), obtaining scout image data of the target area (abstract), processing the target area to create a plurality of sub-target areas of interest (col. 3, lines 51-54), where multiples of the increments are equally dimensioned (2d, 3d, as per Col 3-4) computing a desired acquisition time having a duration greater than the duration of a breathing cycle of the patient (col. 1 line 58- col. 2 line 12), imaging each sub-target area, combining the sub-target area image data to create a set of image data (col. 3 line 11-30), processing the image data set to determine a phase and synchronizing the phase (col 4 line 25 – line 41), where the target area of interest corresponds to a size of a target and is associated with an object to be imaged (col. 6 line 42-64) , where the set of image data corresponds to the target area of interest (col. 5 line 12-60), where synchronizing the phase uses the phase to correlate image data (col. 4 line 25-41), where the system includes an imaging device (col. 1 line 16-24), a processing device and a storage

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medium with machine-readable computer program code (col. 3 line 40-58), and the reference further teaches a method of assigning phases in an image by imaging an object to create image data and system data (col. 4 line 25-41), where the system data includes physiological information, that is respiratory cycle data (col. 4 line 35-36), and the imaging system information corresponds to each respiratory cycle (col. 4 line 30-36) (also see figures 1-4).

3. The Examiner has interpreted Claim 21 as means plus function language, thus invoking the sixth paragraph of 35 U.S.C. 112, and the Examiner has looked to the specification for a description of the structure claimed. Although Barni does not provide the exact structure described in the specification, it is a functional equivalent because it serves the same purpose of determining target areas and sub-target areas of interest, imaging the areas, combining and processing the image data and synchronizing the data, and it achieves the same result of registering images of a patient using retrospective gating.

4. Regarding claim 30, an area of interest has some axial dimension (height, width, size, length) greater than an individual dimension of the detector in that axial direction. That is the size of some direction an area of interest has at least single directional scalar, which is greater in magnitude than that of the detector element's coverage in the same direction. (Col 3 Line 10-30, defining cross-sectional slices as a potential function).

5. Regarding claim 31 Barni discloses acquiring information at multiple locations to create image data for more than one phase of one cycle, and combinind the

synchronized image data for each of the sub-target areas to create image data of the target area at one determined phase (Col 4 Line 25-42, Col 3 Line 11-30, 40-58)

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

6. Claims 2, 5, 10, 16 and 22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Barni in view of General Electric Company (European Patent Application No. 1090586) (hereinafter "EP 1090586").

Barni teaches all of the features of the present invention except for expressly disclosing that the size of the sub-target area corresponds to a size of a detector in a selected axis and that the acquisition time corresponds to a physiological cycle plus at least one of two-thirds of a gantry rotation time or one rotation time. In the same field of endeavor, EP 1090586 teaches slices from a CT imaging device that correspond to the size of a detector on an axis (paras. 26 and 27 and clause 50). It would have been obvious to one of ordinary skill in the art at the time of the invention to subdivide the target area into sub-targets matching the size of the detectors when planning an imaging sequence in order to simplify the processing of the data collected. Although EP 1090586 does not explicitly teach an acquisition time of one physiological cycle plus two-thirds or one gantry rotation time, the reference does teach an asynchronous scan that offsets the

gantry rotation and the physiological cycle (paras. 6 and 25). It would have been obvious to one of ordinary skill in the art at the time of the invention to use such an acquisition time in order to ensure full coverage of the physiological cycle by the imaging device.

7. Claims 8, 17 and 23 are rejected under 35 U.S.C. 103(a) as being unpatentable over Barni in view of Shao et al. (U.S. Patent Application Publication No. 2003/0233039).

8. Barni teaches all of the features of the present invention except for expressly disclosing that the PET emission data is synchronized with the phase. In the same field of endeavor, Shao et al. teaches matching PET data to the respiration phase of a subject being imaged (paras. 10, 48 and 68). It would have been obvious to one of ordinary skill in the art at the time of the invention to synchronize the PET data with the phase of Barni in order to improve the alignment of the images.

9. Claims 25 and 28 are rejected under 35 U.S.C. 103(a) as being unpatentable over Barni in view of Hu et al. (U.S. Patent No. 6,073,041).

10. Barni teaches all of the features of the present invention, including determining a reference point in the data (col. 4, lines 66-67 and col. 5, lines 1-60), except for expressly disclosing that a phase of zero was assigned to the reference point and a phase of 2π was assigned to a subsequent reference point, where the synchronizing included selecting images' with corresponding phases and that the phase was adjusted when the reference point occurred when the imaging system was not active. In the same field of endeavor, Hu et al. teaches a system for retrospective gating of images

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using an assigned phase based on the respiratory cycle, where subsequent reference points were also assigned a phase, in order to register the images, where the phase was adjusted when the reference point occurred when the imaging system was not active (col. 6, lines 58-67, col. 7, lines 1-67, col. 8, lines 1-56, col. 11, lines 10-67 and col. 12, lines 1- 14). Although the particular phase values of zero and 27: were not specifically taught, Hu et al. does teach periodic cycles, thus it would have been obvious to one of ordinary skill in the art at the time of the invention to have used such values to characterize the periodicity of the phases assigned.

Conclusion

11. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the mailing date of this final action.

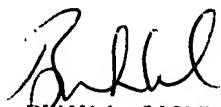
Any inquiry concerning this communication or earlier communications from the examiner should be directed to Joel M. Lamprecht whose telephone number is (571) 272-3250. The examiner can normally be reached on Monday-Friday 7:30AM-4PM.

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If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Brian L. Casler can be reached on (571)272-4956. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

JML
10/10/07


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ART UNIT 3737